

# *Look, Ma, NO VALVES!*

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## Look, Ma, NO VALVES!

That's right. My car has no valves! No valves to get noisy, no valves to adjust, no valves to burn, no valves to stick, no valves to grind, no valves to replace, no side valves, no overhead valves. No valves AT ALL! Just some big holes in the cylinder walls to let the mixture in and the exhaust out. Sounds too good to be true? I assure you it's for real, as I've just completed nearly 100,000 fast and trouble-free miles behind such "valveless" engines and the experience has been so pleasant and so easy on my pocketbook that I'd like to recommend the serious consideration of the "2 cycle" engine to anyone interested in really low cost reliable motoring. Low cost, but not low speed.

### Cycles Versus Cylinders . . .

Perhaps we should first be sure we are clear on this matter of "2 cycle" and "4 cycle" design. "Cycle" has nothing to do with "cylinder" and we can have either 2 or 4 cycle engines with any practical number of cylinders. Most conventional automotive gasoline engines are of the "4 cycle" type. That is, each piston makes 4 strokes or "cycles" to produce one power impulse.

1. Intake stroke. Piston descends.
2. Compression stroke. Piston goes up.
3. Power stroke. Piston goes down.
4. Exhaust stroke. Piston goes up.

The crankshaft of such an engine has made 2 complete revolutions to produce this single power stroke from this cylinder.

The "2 cycle" engine, such as found in the Swedish SAAB, manages to combine all of these necessary phases in only 2 strokes of the piston.

1. Both intake and compression take place on one upward stroke.
2. Both the power stroke and exhaust is accomplished on the downward stroke of the piston.

The crankshaft of this engine has made only ONE revolution to produce this one power stroke from a single cylinder. Therefore, the 2 cycle engine produces twice as many power strokes per cylinder, per revolution, as does the conventional engine. A 2 cylinder 2 cycle engine has the same power flow as does a conventional 4 cylinder engine. A 3 cylinder 2 cycle engine achieves the same smooth power flow as the conventional 6. The 2 cycle engine has long been popular in Sweden and Germany and it is here that it has been brought to its highest state of development.

### Virtually Unlimited Life . . .

The so-called "economy car" has been pretty much just that — "so-called" because the average small European car simply has not been economical in the overall sense when used extensively under U.S. traffic conditions. The little engines have to operate at near maximum power to keep up with the flow of traffic both in the city and on the highway. Unfortunately, the cheap small automotive 4 cycle engine just doesn't stand up to full throttle operation. It doesn't, that is, unless you do what Volkswagen has done — reduce rpm and power output and fit such a high axle ratio that the car simply cannot be over driven. This does result in prolonged life (comparable to the 2 stroke) but at the expense of performance.

It is certainly necessary to consider expenditures for service and repairs along with fuel consumption when arriving at a judgment of overall economy of operation. Even fifty miles per gallon is not economical if the engine needs a complete overhaul every 20,000 miles! And many conventional small cars are indeed lucky to reach that mileage without requiring serious engine work if driven fairly hard. Most need reboring and new pistons before 30,000 miles.

However, even at continuous full power operation, the simple 2 cycle engines fitted to present day German and Swedish cars seem to have virtually unlimited life due to the special characteristics of the 2 stroke design.

### Seven Moving Parts . . .

First, because of their very simplicity: the SAAB and other 2 stroke 3 cylinder engines have really only 7 (that's right, seven) basic moving parts — crankshaft, 3 connecting rods and 3 pistons. Completely eliminated are the camshaft, timing gears, timing chain and tensioner, cam followers, push rods, valves, valve keepers, springs, adjusting screws and nuts, rockers and bushings, valve guides and seats, along with the oiling system consisting of gears, pump, filters, pipes and fittings, relief valves, etc. The 2 cycle design does away with over 25 wearing parts PER CYLINDER. This is real simplicity — which means reliability, which assures true ECONOMY for astronomical mileage.

### Instant Fresh Oil Lubrication . . .

The second basic virtue of the 2 stroke design lies in its ultra-simple lubrication system. Almost all 2 strokes use what the British call the "Petrol" system — wherein the oil is mixed with the fuel in the ratio of 1 quart of cheap oil to 7 to 8 gallons of regular gas. The resulting oil-gas mixture is drawn from the carburetor first into the sealed and compartmented crankcase where it lubricates the roller type connecting rod and main bearings while being compressed prior to being by-passed up into the cylinder where it also copiously lubricates the upper cylinder walls before being burned and expelled. Thus, in a 2 stroke engine, fresh oil in the fuel mixture reaches the working parts of the engine, including the vital, but hard to lubricate, upper cylinder walls in FULL strength before the engine fires! No waiting on a cold morning for thick oil to belatedly (if ever) find its way past the rings. Conversely, on a hot day, while betting across the desert at 75 mph, this simple design without pump, filter or network of leak-prone pipes and joints, draws into its crankcase and cylinders plenty of clean, COOL, fresh oil with each gulp of incoming mixture. (In this type of engine there is, of course, no liquid oil in the crankcase. One never has to "change the oil" for this is, in effect, done with each revolution of the engine.) Thus, because of its highly effective lubrication system, the 2 stroke engine has almost unlimited cylinder bore life and, of course, the roller bearing crankshaft and connecting rods also last for fantastic mileages.

### Smoothness Under Load . . .

The third important characteristic of the 2 cycle engine is its smoothness under load and its excellent torque. You have to drive one of the 2 cycle cars to appreciate its amazing performance. Except at idling speed, these are the smoothest running engines to be found in cars of the economy category. At high road speeds, where the average small 4 cycle engine gives every evidence of being made up of a lot of noisy working parts, the 2 stroke is at its very best — feeling and sounding more like a turbine than a reciprocating engine! This mechanical smoothness and silence is permanently built in — you don't have to spend money or time on tuning and valve adjustments every couple of thousand miles. Do you have any idea of just what you've spent on valve adjustments alone over the past few years? At \$5 to \$10 per, this mounts up after a while. As I said, this is money you never have to spend on a 2 stroke — how can you spend money adjusting what you haven't got?

### Fuel Economy . . .

In theory, and according to most engineering textbooks, the 2 cycle engine will not equal the 4 cycle engine in fuel economy. Most of these textbooks were written some years ago and I suspect that the writers never tested their theories and their engines on the open road! I have driven several makes of economy cars across the United States and kept accurate mileage records. Cruised at 60-65 mph whenever possible, these popular 4 cycle jobs gave from 23 to 28 miles per gallon. My 2 stroke sedan, heavily loaded, gave exactly 27.5 mpg, but at a cruising speed of 70 to 75 mph! Other owners of 2 stroke cars get in the neighborhood of 34-38 miles per gallon at more reasonable speeds, which compares most favorably with the best mileage achieved by 4 stroke engines driven at their most economical speeds. The 2 stroke does indeed hold its own in regard to fuel consumption and additionally provides a cruising speed generally well in excess of the actual top speed of comparable sized or larger-engined 4 cycle designs. This outstanding performance is achieved, remember, with only 7 moving parts in an engine, having the smooth power flow of a six and endowed with an incredibly long life!

## Quick Starting in Cold Weather . . .

Easterners will derive an additional dividend from the use of a 2 stroke — this is far and away the world's champion cold weather engine. By virtue of its drag-free lubrication and frictionless roller bearing crankshaft, the 2 stroke engine, such as SAAB, spins to a quick start with incredibly little drain on a weakened cold battery. Furthermore, due to the "homogenizing" of the mixture by the crankcase induction, the 2 stroke can be driven away immediately after starting in cold weather with no further use of the choke — and with no coughing or stalling. This is in complete contrast to the four stroke which, on a really cold day, requires the use of the choke until it has pretty well warmed up, by which time one's destination may already have been reached.

## 0 - 60 mph in 12 Seconds . . .

Recently the two largest firms specializing

in 2 stroke motor cars have introduced even higher performance "sports" versions of their standard engines without adding any mechanical complication, merely raising the compression ratios, altering the port timing, and improving the manifolding and carburetion. SAAB, with an engine displacing only 750 cc, now boasts an output of 57 bhp and 0 to 60 mph in 12 sec. with its new GranTurismo model. This roomy and exceedingly comfortable sedan will give fits to most sports cars with engines twice as large, few of which will stay with it hour after hour on a fast road.

## So Who Needs Valves . . . ?

So who NEEDS valves? I've learned from 100,000 miles of actual experience that the 2 stroke engine provides equal fuel economy, far better performance, unequaled reliability, lowest possible service costs and, therefore, best overall economy. Valves? You're better off without the \$%\*!# things!

